UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/081,387	02/22/2002	Lars Olovsson	M-11641 US	1611

36257   7590   08/24/2005

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EXAMINER
ORTIZ RODRIGUEZ, CARLOS R

ART UNIT	PAPER NUMBER
2125	

DATE MAILED: 08/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

— The MAILING DATE of this communication appears on the cover sheet with the correspondence address —

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>11 July 2005</u>.

2a)☐ This action is **FINAL.**   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-28</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-28</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>3/3/05</u>.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____ .

DETAILED ACTION

Claim Objections

1.   Claims 1-28 objected to because of the following informalities: The term "Eularian" seems to be "Eulerian". Appropriate correction is required.

2.   Claim 6 objected to because of the following informalities: The term "at first state" seems to be "at a first state". Appropriate correction is required.

Claim Rejections - 35 USC § 101

3.   35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 22-24 rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claimed computer programs do not define any structural and functional interrelationships between the computer program and other claimed elements of a computer which permit the computer program's functionality to be realized.

Claim Rejections - 35 USC § 112

4.   The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5.   Claim 3 rejected under 35 U.S.C. 112, first paragraph.

Claim 3, rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement

requirement. The claim(s) contains the term "fill fraction" which was not described in the specification in such

a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make

and/or use the fill fraction. The results of the "fill fraction" are utilized to realize subsequent procedures but,

there is no disclosure regarding how to make or use the "fill fraction".

6.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which
>
> the applicant regards as his invention.

7.   Claims 1-9, 11-17, 18-21 and 25-28 are rejected under 35 U.S.C. 112, second paragraph.

Regarding claims 12-17 and 18-21 and 25-28 rejected under 35 U.S.C. 112, second paragraph, as being

indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as

the invention. The term "automatically switching", is unclear if the automatic feature is a result of a computer

step or if it is a result of some manual input that "activates" the automatic switching.

Regarding claims 1-8 and 11, rejected under 35 U.S.C. 112, second paragraph, as being incomplete for

omitting essential steps/elements, such omission amounting to a gap between steps/elements. See MPEP §

2172.01. The omitted steps are: Steps involved with projecting the nodes onto the surface of the material. It is

unclear how the projecting step is realized, it is recommended that the applicant disclose the procedure involved

in projecting.

Regarding claim 2, rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting

essential steps/elements, such omission amounting to a gap between steps/elements. See MPEP § 2172.01. The

omitted steps are: Steps involved with deleting empty elements. It is unclear how the deleting empty elements

is realized, it is recommended that the applicant disclose the procedure involved in deleting empty elements.

Regarding claim 4, rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps/elements, such omission amounting to a gap between steps/elements. See MPEP § 2172.01. The omitted steps are: Steps involved with explicitly integrating the Eulerian simulation and explicitly integrating the Lagrangian simulation. It is unclear how the integration step is realized, it is recommended that the applicant disclose the difference between the explicit integration and the implicit integration and the necessary procedures in order to realize said integrations.

Regarding claims 5, 11, and 16, rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps/elements, such omission amounting to a gap between steps/elements. See MPEP § 2172.01. The omitted steps are: Steps involved with merging nodes together. It is unclear how the merging nodes together step is realized, it is recommended that the applicant disclose the procedure involved in merging nodes.

Regarding claims 7, rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps/elements, such omission amounting to a gap between steps/elements. See MPEP § 2172.01. The omitted steps are: Steps involved with converting the results from Eulerian to Lagrangian. It is unclear how the converting is realized, it is recommended that the applicant disclose the procedure involved in converting from Eularian simulation to Lagrangian simulation.

Regarding claims 9, rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps/elements, such omission amounting to a gap between steps/elements. See MPEP § 2172.01. The omitted steps are: Steps involved with mapping the solution from the Eulerian element grid of the first phase onto a Lagrangian element grid. It is unclear how the mapping is realized, it is recommended that the applicant disclose the procedure involved in mapping from an Eulerian element grid onto a Langrangian grid.

Claim Rejections - 35 USC § 102

8.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the

rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9.   Claims 1-28 rejected under 35 U.S.C. 102(b) as being anticipated by Maker, "Implicit Springback

Calculation Using LSDYNA", Livermore Software Calculation Using LSDYNA, 5th International LS-DYNA

Users Conference, September 21-22, 1998.

Regarding claims 1-28, "Implicit Springback Calculation Using LSDYNA" discloses a method for

performing a finite element analysis comprising: performing a Eulerian simulation and switching to a

Lagrangian simulation (L11-12). The features wherein a grid having nodes forming elements is superimposed

with a material having a surface; and thereafter projecting the nodes onto the surface of the material; and

thereafter mapping a set of solution variable fields to the material with an Eulerian mapping algorithm are

inherent to "Implicit Springback Calculation Using LSDYNA", and also in a more general manner these

features are also generic characteristic of finite element simulations. "Implicit Springback Calculation Using

LSDYNA", further discloses that after performing the mapping performing a Lagrangian simulation (L11-12);

determining dimensions at a first state after a forming operation with an explicit Eulerian based finite element

simulation (L1-3); and determining the dimensions at a final state after the forming operation by running an

implicit Lagrangian based finite element simulation using the results of the Eulerian based simulation, the

results comprising the dimensions at the a first state (L11-12). "Implicit Springback Calculation Using

LSDYNA", further discloses a springback deformation resulting from residual energy within the material (L6-

7).

Deleting empty elements and the nodes only connected to empty elements, wherein a node within the material surface is projected to the surface if the fill fraction is less than 0.7, and wherein a node without the material surface is projected to the surface if the fill fraction is in the range of about 0.5 to 0.8 is an option/decision of the person or designer performing the simulation. Any other possible range could be utilized. These possibilities are intrinsic characteristic of finite element analysis and specifically during "stamping simulations" as implicitly taught by "Implicit Springback Calculation Using LSDYNA".

Regarding the LS-DYNA tool taught by "Implicit Springback Calculation Using LSDYNA", which is utilized to perform the claimed method, it should be noted that this tool is a nonlinear finite element analysis tool utilized to perform explicit and implicit analysis. This tool is known in the art to provide capabilities for automatically switching from dynamic explicit to static implicit analysis at the end of a simulation. This tool is commonly utilized to perform Eulerian simulations and Lagrangian simulations. It should be noted that Eulerian simulation are utilized for dynamic explicit analysis and Lagrangian simulation are utilized for static implicit analysis due to their intrinsic restrictions. As disclosed by "Implicit Springback Calculation Using LSDYNA", static implicit integration is preferred at the end of a forming simulation (springback phase).

Specific details regarding features of the LS-DYNA tool could be found in "LS-DYNA Keyword user's manual, Nonlinear Dynamic Analysis of Structures", Livermore Software Technology Corporation, Version 950, May 1999.

Citation of Pertinent Prior Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following patents are cited to further show the state of the art with respect to eulerian-lagrangian mapping for finite element analyses:

a.   U.S. Pat. No. 6,560,570 to Dohrmann et al., which discloses method and apparatus for connecting finite element meshes and performing simulations therewith.

b.   U.S. Pat. No. 6,678,642 to Budge, which discloses method of and apparatus for modeling

interactions.

c.   U.S. Pat. No. 6,785,640 to Lu et al., which discloses surface evaluation in a stamping

manufacturing process utilizing true reflection line methodology and computer graphics technology.

The following publications are cited to further show the state of the art with respect to eulerian-

lagrangian mapping for finite element analyses:

d.   Plimpton et al., "Transient Dynamics Simulations : Parallel algorithms for contact detection and

smoothed particle hydrodynamics", IEEE, 1996.

e.   LS-DYNA News, "An Information Letter for users and applications of LS-DYNA edited by the

European LS-DYNA distributor group", Issue 3, January 1999.

f.   Stoker, "Development of the Arbitrary Lagrangian-Eulerian Method in Non-Linear Solid

Mechanics. Application to Forming processes", University of Twente, February 1999.

g.   "LS-DYNA Keyword user's manual, Nonlinear Dynamic Analysis of Structures", Livermore

Software Technology Corporation, Version 950, May 1999.

h.   Antaki et al., "A parallel dynamic-mesh lagrangian method for simulation of flows with dynamic

interfaces", IEEE, 2000.

i.   FEA Information Co., 3rd Issue, December 9, 2000.

j.   Benamou, "An Eulerian numerical method for geometric optics", Canum, 2000.

k.   Guilkey et al., "An implicit time integration strategy for use with the material point method",

Elsevier Science Ltd, 2001.

l.   "LS-DYNA Keyword user's manual, Volume 1", Livermore Software Technology Corporation,

Version 960, May 2001.

m.   FEA Information International News, Issue March, 2001.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carlos Ortiz-Rodriguez whose telephone number is

(571) 272-3747. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo P. Picard can be reached on (571) 272-3749. The central official fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the general information number at 800-786-9199.
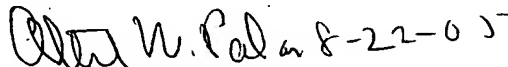
Information regarding the status of an application may be obtained from the Patent Application

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have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-

9197 (toll-free).

Carlos Ortiz-Rodriguez
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cror

August 11, 2005

ALBERT W. PALADINI
PRIMARY EXAMINER